CLAIMS

[Claim 1]

A cargo handling apparatus of a cargo handling industrial vehicle, comprising:

an engine;

a generator-motor;

a clutch for connecting/disconnecting a transmission of power between the engine and the generator-motor;

electric storage means connected to the generator-motor;

cargo handling means for performing cargo handling work;

load detection means for detecting an amount of a cargo handling load; and

a controller,

wherein the generator-motor is driven in one of: a generator mode of generating electric power by being driven by power of the engine transmitted through the clutch and storing the electric power in the electric storage means; and a motor mode of being driven as a motor by receiving a supply of electric power from the electric storage means,

when the load detected by the load detection means is smaller than a predetermined value, the controller sets the engine in a stopped or idle state, disconnects the transmission of the power between the engine and the generator-motor by the clutch, and drives the cargo handling means by the generator-motor in the motor mode, thereby performing the cargo handling work;

when the load detected by the load detection means becomes the predetermined value or more during the cargo handling work in a state where the transmission of the power between the engine and the generator-motor is disconnected by the clutch, the controller starts an increase of the number of revolution of the engine while increasing an output of the generator-motor in the motor mode, and

when the number of revolution of the engine is made equal to the number of revolution of the generator-motor, the controller connects the transmission of the power between the engine and the generator-motor by the clutch, and drives the cargo handling means by both of the power of the engine and the power of the generator-motor, thereby performing the cargo handling work.

[Claim 2]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 1, further comprising a continuously variable transmission disposed between the engine and the generator-motor.

[Claim 3]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 2, wherein, when the number of revolution of the engine, which is shifted by the continuously variable transmission, is made equal to the number of revolution of the generator-motor after the increase of the number of revolution of the engine is started, the transmission of the power between the engine and the generator-motor is connected by the clutch.

[Claim 4]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 3, wherein, after the number of revolution of the engine, which is shifted by the continuously variable transmission, is made equal to the number of revolution of the generator-motor, and the transmission of the power between the engine and the generator-motor is connected by the clutch, a transmission ratio of the continuously variable transmission is controlled to be changed according to the increase of the number of revolution of the engine.

[Claim 5]

A cargo handling apparatus of a cargo handling industrial

vehicle according to claim 4, wherein the transmission ratio of the continuously variable transmission is controlled to be changed to maintain a synchronized state of the engine and the generator-motor according to the increase of the number of revolution of the engine.

[Claim 6]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 1,

wherein the controller sets the clutch in a disconnection state when the load detected by the load detection means is smaller than the predetermined value, and sets the clutch in a connected state when the increased number of revolution of the engine is made equal to the number of revolution of the generator-motor in a case that the load detected by the load detection means during the cargo handling work in the state where the transmission of the power between the engine and the generator-motor is disconnected by the clutch becomes the predetermined value or more.

[Claim 7]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 1, wherein:

the clutch is composed of a one-way clutch;

when the load detected by the load detection means is smaller than the predetermined value, the engine is set to a stopped or idle state to automatically disconnect the transmission of the power between the engine and the generator-motor; and

in this state, when the increased number of revolution of the engine is made equal to the number of revolution of the generator-motor in a case that the load detected by the load detection means becomes the predetermined value or more, the transmission of the power between the engine and the generator-motor is automatically connected.

[Claim 8]

A cargo handling apparatus of a cargo handling industrial

vehicle according to claim 1, wherein the cargo handling means includes a fork, and a loading pump discharging pressure oil for moving the fork.

[Claim 9]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 1, wherein the load detection means includes a loading lever position sensor detecting an opening of a loading lever.

[Claim 10]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 8, wherein the load detection means includes a pressure sensor detecting pressure of the pressure oil discharged from the loading pump.

[Claim 11]

A cargo handling apparatus of a cargo handling industrial vehicle according to claim 8, wherein the load detection means includes a load sensor detecting weight of a cargo lifted up by the fork.